11: India G-4, 5 (1960-1961) 1962 AW11 Kerala AW11

per acre, while the same for paddy is only 40 :40 :30. It is very low for leguminous crops—at 0 :20 :20 for pulses and 20 : 20 : 20 for groundnuts.[1] These dosages are not the optimum. These are just the average that may be considered adequate during a period of shortage of fertilizers. There are many farmers who apply as much as 80 lbs. of nitrogen per acre to rice while there are others who, on account of shortage of fertilizers apply only 15 lbs. per acre. Since fertilizer allocations are not made for individual crops, a dosage ratio of NPK 40 : 40 : 30 per acre may be considered as an average requirement for the State in the future. But in view of shortages in the country for phosphatic and potassic fertilizers, the dosage may be put at 40 : 20 : 15. The total annual requirements of crop fields on this basis would be 35,700 tons of nitrogen, 17,700 tons of P_2O_5 and 13,400 tons of K_2O.

2.47 In view of the peculiar soil conditions and reaction, attention will have to be paid to the correct choice of fertilizers. At present fertilizers are being used indiscriminately. For example, ammonium sulphate, the most popular fertilizer in the State, is being used even on high acidity soils. Such applications may do damage to the soil by increasing further the soil acidity. The selection of various types of fertilizers in the future should, therefore, be on rational and scientific basis, so that the fertilizers also help in correcting the soil deficiencies. Urea is, perhaps, eminently suited for Kerala. It is, however, not possible to make any specific suggestion on the requisite type of fertilizers for the State as adequate data on the performance of various types of fertilizers are not available. It is, therefore, suggested that a large number of trials should be conducted all over the State with a view to choosing the right type of fertilizer and dosages for various crops in different regions. The result of such trials should be made known to users through the extension machinery.

2.48 It is not possible to give a precise estimate of the increase in agricultural production from the proposed fertilizer consumption programme owing to difficulties in estimating the share of fertilizers for different crops. Knowledge about the rates of return from fertilizers for various crops, is also inadequate. Assuming, however, that roughly three-fourths of the proposed quantity is used for rice and other foodgrains, the additional production of cereals and pulses on the basis of available yardsticks may be expected to be 387,000 tons by 1970-71.

Irrigation

2.49 ***Existing Position***: Irrigation resources of Kerala are very rich. In all, there are 44 rivers in the State. The run off of water from the west-flowing rivers is estimated to be of the order of 2,560,800 million cubic feet per annum, while that of east-flowing rivers is 196,000 million cubic feet.

2.50 The first irrigation project to be taken up in the State was the Kodayar Extension Scheme which was completed by 1947. At the beginning of the First Plan

[1] Dosage for NPK (ratio in lbs. per acre for other crops) is

Tapioca	80 :80 :160	Ginger	50 :50 :100
Oilseeds	10 :20 : 20	Sugarcane	100 :80 :100
Cotton	50 :30 : 30	Fruits/ Vegetables	50 :50 :100

11: India G-4, 5 (1960-1961) 1962 AWll Kerala AWll

period, the State had three major irrigation projects, viz., Peechi and Chalakudy I, apart from the Kodayar Extension Scheme. During the First Plan, two more projects viz., Vazhani and Neyyar I were added to the list. At the time of the reorganization of States, Nanjinand area, served by the Kodayar Extension Scheme, got transferred to Madras but in return Kerala gained three projects through the annexation of Malabar area viz., Malampuzha, Walayar and Mangalam. During the Second Plan period, six more projects have been completed. By 1956-57 the total irrigated area had reached 8.29 lakh acres, that is, about 30 per cent of the net sown area under field crops.

2.51 Canals are the main source of irrigation in Kerala accounting for about 50 per cent of the gross irrigated area (Table 12).[2] Tanks and wells irrigate 9.28 per cent and 3.49 per cent respectively of the gross irrigated area. One interesting feature about irrigation in Kerala is that irrigation from the 'other sources' accounts for a particularly high percentage of area irrigated, viz., 37 per cent. These other sources include hill streams, small diversion works, water pumped from streams and rivers, etc. These are quite numerous in Kerala on account of the high rainfall received in the State.

2.52 The main beneficiary from existing irrigation facilities is paddy, accounting for over two-thirds of the gross irrigated acreage. The remaining irrigated area is shared by other food and non-food crops. The exact breakdown is not available but it is believed that banana and coconut account for much of what is left.

2.53 The benefit accruing from the 13 irrigation works which had been taken up till the end of the Second Plan and their relative importance are given in the following table.[1]

Benefit	*Area benefiting (acres)*	*Percentage*
One new crop	55,314	20.11
New conversion to double cropped paddy	63,786	22.98
Stabilization of one crop	25,300	9.11
Stabilization of two crops	120,660	43.48
Drainage, flood control, dewatering, etc.	12,000	4.32
TOTAL	*277,060*	*100.00*

2.54 It can be seen from the above table that the largest extent of benefit is received from the stabilization of two crops. Conversion of fresh areas to cultivation of paddy as a result of the new irrigation facilities is only 22 per cent of the total area benefited. A large proportion of benefit in the form of stabilization of existing crops rather than in the form of double or triple cropping is due to the fact that Kerala gets assured rainfall both from the south-western as well as the north-eastern monsoon. There are thus very few patches of land which are not able to grow paddy due to the absence of rainfall.

2.55 In terms of additional output of foodgrains, however, the benefit from new conversions is much greater than from stabilization, as can be seen from the

[1] Based on figures supplied by the Department of Irrigation, Kerala.

[2] [see p. 208, category 116 -- Analyst]

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following table.

Benefit	Additional output of foodgrains per acre (in tons)
One new crop	0.5
New conversion to double cropped paddy	1.0
Stabilization of one crop	0.1
Stabilization of two crops	0.2

On the basis of these co-efficients, increase in output contributed by the 13 projects comes to 129,636 tons, giving a weighted average of 0.47 tons of additional output of paddy per acre.

2.56 *Future Development of Irrigation*: Due to a difficult and uneven terrain, the cost of digging canals and constructing dams is comparatively high in Kerala. The average capital cost per acre for irrigation from major and medium schemes is roughly Rs. 885 per acre as against the all-India average of roughly Rs. 500 per acre. The expensive nature of irrigation schemes and the high level of rainfall which Kerala receives, naturally set a limit to the development of irrigation works.

2.57 The proportion of new conversions out of the total area benefited is rather small. However, double and triple cropping can be made possible only by ensuring regular water supply through the irrigation schemes. Irrigation facilities are also essential for increased application of fertilizers to the second and third crops.

2.58 A Master Plan for the irrigation resources of Kerala was prepared by the Irrigation Branch of the Public Works Department. According to it, the additional irrigation potential available in the State is about 896,000 acres. Of this 822,000 acres would be for the existing area and only 74,000 acres for conversion of dry land to irrigated area. The cost of the above programme is estimated at Rs. 79.34 crores. Rice would be the main beneficiary from this irrigation programme. Additional annual production of rice from these schemes would be roughly 4.49 lakh tons valued at Rs. 17.9 crores. In addition, if other benefits such as raising the third crop of pulses and the extension of area under high value crops like coconut, sugarcane, banana, cotton, etc., are also taken into account, the benefits may amount to another Rs. 10.0 crores. This would give a capital output ratio of about 2.5.

2.59 In view of the particular conditions prevailing in Kerala, it seems desirable that a greater emphasis should be placed on minor rather than on major irrigation works. There is justification for adopting this point of view on a number of grounds. Major irrigation works are a necessity in those areas where vast areas of cultivable land can be opened up by construction of major irrigation projects. In Kerala, as pointed out above, the benefit lies mainly in providing irrigation facilities to those areas where one crop is already being raised. Since the size of investment required for major irrigation works is much larger is comparison to that required for minor work and capital resources are scarce, minor irrigation works are far more suitable for Kerala. The nature of terrain in Kerala also makes it difficult to lay a vast network of canals. Moreover, for major irrigation works, the State has to bear all the investment cost whereas minor irrigation works help in tapping localized investible resources available with the agriculturists.

11: India G-4, 5 (1960-1961) 1962 AWII Kerala AWII

2.60 Minor irrigation works have other advantages as well. In the first place, the period of construction being much shorter than in the case of major works, the lag between investment and yield is comparatively short. Secondly, since the minor works are executed on a decentralized basis they have greater effectiveness in utilizing the pockets of surplus manpower. The problem of organizing manpower squads is likely to be less intractable. Thirdly, in Kerala there are a large number of irrigable tracts which do not occur in contiguous blocks. These scattered areas cannot get the canal water facilities provided by major irrigation dams but there are a number of streams which are conveniently situated for minor irrigation development.

2.61 Keeping these points in view, it is suggested that during the coming decade it is not necessary to develop the full potential of 8.96 lakh acres through major irrigation projects. However, the State should try to implement the schemes which have been suggested by the Master Plan for inclusion during the Third and Fourth Plans. The list of these schemes is given in Table 15. These would benefit an area of 4.33 lakhs at an investment of Rs. 39.3 crores. On the basis of current yardsticks, additional output of foodgrains from these major irrigation schemes is expected to be 2.16 lakh tons. The Third Plan has allotted Rs. 11.23 crores for major irrigation. The balance of Rs. 28.1 crores will have to be invested during the Fourth Plan. These figures only indicate the rough order of magnitude and will have to be changed, if the cost estimates given in the Master Plan are revised after further investigation.

2.62 *Minor Irrigation*: A Minor Irrigation Team, which was appointed by the Committee on Plan projects has submitted its report on Kerala. This report reveals many interesting features regarding the scope for various types of scheme. Some of its important recommendations, which should be implemented expeditiously, are discussed below.

2.63 *Spring-fed Tanks*: There are a large number of spring-fed tanks in Kerala, but the tanks are exposed to dangers of silting, breaching by storm water and heavy evaporation losses. In order to obviate these difficulties, the streams should be tapped underground by means of open jointed pipe drains placed in a reverse filter, cutting across the springs, in preference to traditional tanks.

2.64 *Diversion Weirs and Channels*: Construction of such channels is feasible on a large scale as the Kerala rivers carry a good flow from May to February due to the two heavy monsoons. Moreover, waters from the hydro-projects, now being planned for construction in the mountains, could be diverted for irrigating the coastal plains by means of diversion works. Since most of the river beds are covered by paddy fields, any increase in the water level due to afflux above diversion weirs is resented by the people whose fields get submerged. Therefore, weirs with control gates ought to be provided.

2.65 *Lift Irrigation*: The topographical and other features of the State are eminently suited for the development of lift irrigation as there are a large number of small blocks of field located on the fringe of the rivers, spread all over the State. Another factor in favour of lift irrigation is the availability of cheap electric power. Implementation of an extended programme of lift irrigation would, therefore, be highly desirable even though the operational cost of these schemes is higher.

11: India G-4, 5 (1960-1961) 1962 AWll Kerala AWll

2.66 *Surface Reservoirs*: Adequate provision should be made for silting capacity in tanks and reservoirs. In the case of small tanks at least about 20 per cent of the total capacity should be reserved for silting.

2.67 *Prevention of Ingress of Salt Water*: Large areas of cultivated land in Kerala are well below the mean sea level and are subject to flood by fresh water brought over by rivers in the monsoon season and salt water during other seasons. There is need for construction of suitable projects to prevent the onrush of salt water into the paddy fields. The scheme to dewater such areas should also form an important item in the minor irrigation programme.

2.68 No estimates are available for the likely area that could be irrigated from minor irrigation works. Nevertheless, it is considered to be quite substantial. It is learnt from discussions with the State Government authorities that the extent of such possibilities is around 300,000 acres. Of this, the share of lift irrigation and ground water utilization (wells, filter points, etc.) may be put at 100,000 acres. Lift irrigation and ground water utilization are works of a small size and, therefore, should be undertaken by the beneficiaries themselves with the help of Government aid.

2.69 In view of the emphasis laid on minor works, it is suggested that 200,000 acres of area (this also includes area benefited from flood control and drains) should be developed from minor irrigation sources. Of this, about half may be from lift irrigation and ground water sources. The average capital cost of providing minor irrigation would be in the neighbourhood of Rs. 1,000 per acre. Total investment for minor irrigation development schemes as suggested above would come to Rs. 20 crores. Of this Rs. 10 crores would be in the public sector and the rest will have to be provided by individual agriculturists.

2.70 The minor irrigation schemes proposed here would benefit not only rice, but also other crops such as arecanut, lemon grass and banana. For purpose of calculations it may be assumed that only half of proposed irrigation is used for rice. The additional production of rice on account of minor works would thus be about 50,000 tons annually by 1970-71.

Improved Agricultural Practices

2.71 Agricultural practices in Kerala are relatively of advanced type. Rice, the principal food crop of the State, is cultivated quite intensively. Transplanting is practised all over the State, even under the submerged type of cultivation. In case of dry seed bed crops like tapioca, ginger, groundnut, etc., the farmers generally take care to see that interculture and earthing operations are satisfactorily done.

2.72 However, there is further scope for increasing crop yields by improving the agricultural practices and techniques. Improved practices such as scientific crop rotation by including a legume crop as against the existing practice of successive rice crops, deep ploughing, adequate plant protection, etc., can increase the yields to some extent.

2.73 With the proposed increase in irrigated area it would be possible to raise a third crop of pulses either of black gram or green gram in succession to two crops

31: Slater S-5 (1916-1917) 1918 AW1 India
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Savings are not invested in industrial undertakings, there being no openings for the same. 454

On the question of rural indebtedness, its causes and extent, much can be written. There has been, I am told, an enormous increase in indebtedness among all classes. Nearly 75 per cent are in debt, especially so the poor agriculturists. The great proportion of small landholders and agricultural workers, the want of diversity of industry and occupation, the rise in the price of commodities, the high usurious interest which a few take for money advanced, the substitution of money for kind in taxes, the high cost of education, lower and higher, to which Brahmans resort now-a-days, the high value which people set on Government service, however small the pay, all these are working, some generally and others in particular cases, to cause and perpetuate rural indebtedness. Co-operative credit societies could do much to help the people out of it. I may also mention that litigation is also responsible. For every paltry difference resort is had to the Munsif's or the Magistrate's Court, as there are no other means of settling such differences. There are nearly twenty-five vakils or pleaders in the Munsif's Court alone who cast nets to earn something by favouring the litigious spirit. Among the Brahmans the 'dowry system' is working some mischief. Every girl has to be given in marriage before her twelfth year and the bridegroom demands a good round sum. Social reformers condemn the system. A redeeming feature of it, viz., that that sum is a substantial help to the bridegroom's costly higher English education is not wholly to be forgotten; and no Brahman stops his education until thrown out by the University or money ceases to be forthcoming. 426 [691] [582] [871]

The proportion of debtors who have liberated themselves from debt may be estimated at nearly a fourth.

Communal village life is unknown in the 'village.' The Brahmans in the 'town' try to revive a 'Samooham' (gathering) but with no success so far. There is no communal property. Separate individual life is the order. The local Muhammadans and Christians keep up a kind of unity within their 'castes' because of their religion and Church. The Hindu temples in the village are managed by the State Government. For every slight improvement in the village the people have to approach the Government. For example, the local tank has been in ruins for the last three or four years; the Government of course helps the people, but the tank is not yet repaired because of official delay and when it is actually done, as was done once a few years back, the contractor earns a good round sum as profit and the work is not properly carried out. 621 653

Temples and festivals.—The annual religious festival in the local temple at Watakanchery town which lasts for five days is conducted by the Government. Rs. 128 and 128 paras of paddy (24 cwt.) are spent; a contractor bids for the sum and he conducts the festival. 796

The people of the village themselves conduct an annual religious festival at a temple nearly three miles to the north by collecting subscriptions. They spend nearly Rs. 300 on the occasion. It is pleasant to witness a procession in Malabar. So many elephants are ornamented and made to stand in array. The number of elephants depends upon the depth of the purse. Drum-beaters